Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2507665523

BIOLOGY **0610/53**

Paper 5 Practical Test **May/June 2021**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

For Examiner's Use	
1	
2	
Total	

This document has **12** pages. Any blank pages are indicated.

© UCLES 2021

1 Vitamin C is an important component of a balanced diet. Many health drinks contain vitamin C.

You are going to estimate the concentration of vitamin C in a health drink by comparing it to solutions with known concentrations of vitamin C.

DCPIP is an indicator for vitamin C. When added to a vitamin C solution, the blue DCPIP reacts with vitamin C and becomes colourless. Drops of DCPIP are added to the vitamin C solution until the solution remains blue.

Read all the instructions but DO NOT CARRY THEM OUT until you have drawn a table for your results in the space provided in 1(a)(ii).

You should use the safety equipment provided while you are carrying out the practical work.

Step 1 Label four small beakers **A**, **B**, **C** and **D**.

Step 2 Use the large syringe and the information in Table 1.1 to make the vitamin C solutions in the four labelled beakers.

Table 1.1

beaker	volume of 1.00% vitamin C solution / cm^3	volume of water / cm^3	final percentage concentration of vitamin C
A	1	3	0.25
B	2	2	0.50
C	3	1	
D	4	0	1.00

(a) (i) Complete Table 1.1 by calculating the final percentage concentration of vitamin C in beaker **C**.

.....% [1]

Step 3 Label four test-tubes **A**, **B**, **C** and **D** and place them in a test-tube rack.

Step 4 Use the small syringe to transfer 0.5 cm^3 of vitamin C solution from beaker **A** to test-tube **A**.

Step 5 Repeat step 4 using beaker **B** and test-tube **B**.

Step 6 Repeat step 4 using beaker **C** and test-tube **C**.

Step 7 Repeat step 4 using beaker **D** and test-tube **D**.

Step 8 Fill the dropping pipette with the **DCPIP** solution.

© UCLES 2021

Step 9 Put one drop of DCPIP into test-tube **A** and swirl gently to mix.

The blue colour should disappear as the vitamin C reacts with the DCPIP. You will be counting the number of drops of DCPIP you put into the test-tube.

Step 10 Repeat step 9 until the blue colour does **not** disappear and the solution remains blue.

Step 11 Record, in your table in **1(a)(ii)**, the total number of drops of DCPIP you have put into test-tube **A**.

Step 12 Repeat step 8 to step 11 with test-tubes **B**, **C** and **D**.

(ii) Prepare a table to record your results.

[4]

(iii) State a conclusion for your results.

.....

.....

..... [1]

Step 13 Label a clean test-tube **H**.

Step 14 Use the small syringe to put 0.5 cm^3 of health drink **H** into test-tube **H**.

Step 15 Add drops of DCPIP and swirl gently until the colour in the test-tube remains blue.

(iv) Record the number of drops of DCPIP you added to test-tube **H**.

..... drops [1]

(v) Estimate the percentage concentration of vitamin C in health drink **H** using your results from **1(a)(ii)** and **1(a)(iv)**.

..... % [1]

(vi) Identify **two** variables that were kept constant in this investigation.

1 .....

2 .....
[2]

(vii) Explain why it was important to swirl the contents of the test-tube after adding each drop of DCPIP in step 9.

.....

.....

..... [1]

(b) Repeating the investigation would improve the method used.

Suggest **two** other improvements to the method that would allow a more accurate estimation of the concentration of vitamin C in health drink **H**.

1 .....

.....

2 .....

.....
[2]

(c) Explain why counting the number of drops of DCPIP is not accurate.

.....

.....

..... [1]

(d) The manufacturers of health drink **H** claim that it also contains protein and glucose.

Describe how you would test health drink **H** for protein and glucose.

Include the results for a positive test.

protein .....

.....

.....

.....

.....

glucose .....

.....

.....

.....

.....

.....

.....

.....

[5]

[Total: 19]

BLANK PAGE

2 **(a)** You are provided with the leaf of a plant, **L1**.

(i) Make a large drawing of leaf **L1**.

[4]

(ii) Measure the length of your drawing in **2(a)(i)**. Include the unit.

Indicate on your drawing where you measured this length.

length of the leaf in your drawing .....

Measure the actual length of the leaf **L1**. Include the unit.

actual length of leaf **L1** .....

Calculate the magnification of your drawing using the equation:

$$\text{magnification} = \frac{\text{length of the leaf in your drawing}}{\text{actual length of leaf } \mathbf{L1}}$$

.....

[3]

(b) A student used an aquatic plant to investigate the effect of carbon dioxide concentration on the rate of photosynthesis. The production of oxygen gas can be used as an estimate of the rate of photosynthesis.

The student set up the apparatus shown in Fig. 2.1. He counted the number of bubbles produced in 5 minutes. The carbon dioxide concentration in the water around the aquatic plant was 2 mg per dm^3.

He repeated the experiment with five different concentrations of carbon dioxide.

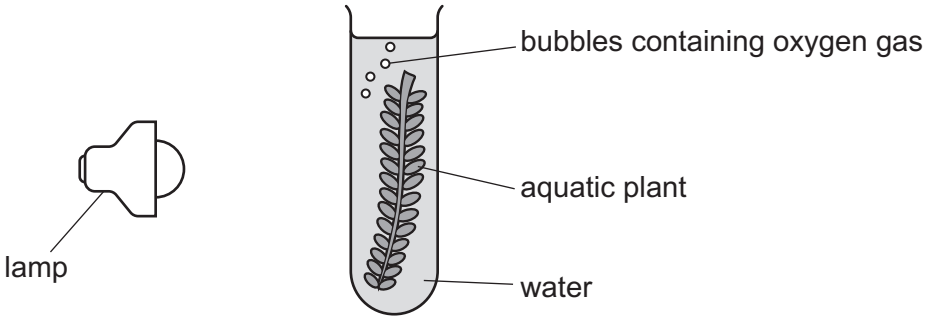


Fig. 2.1

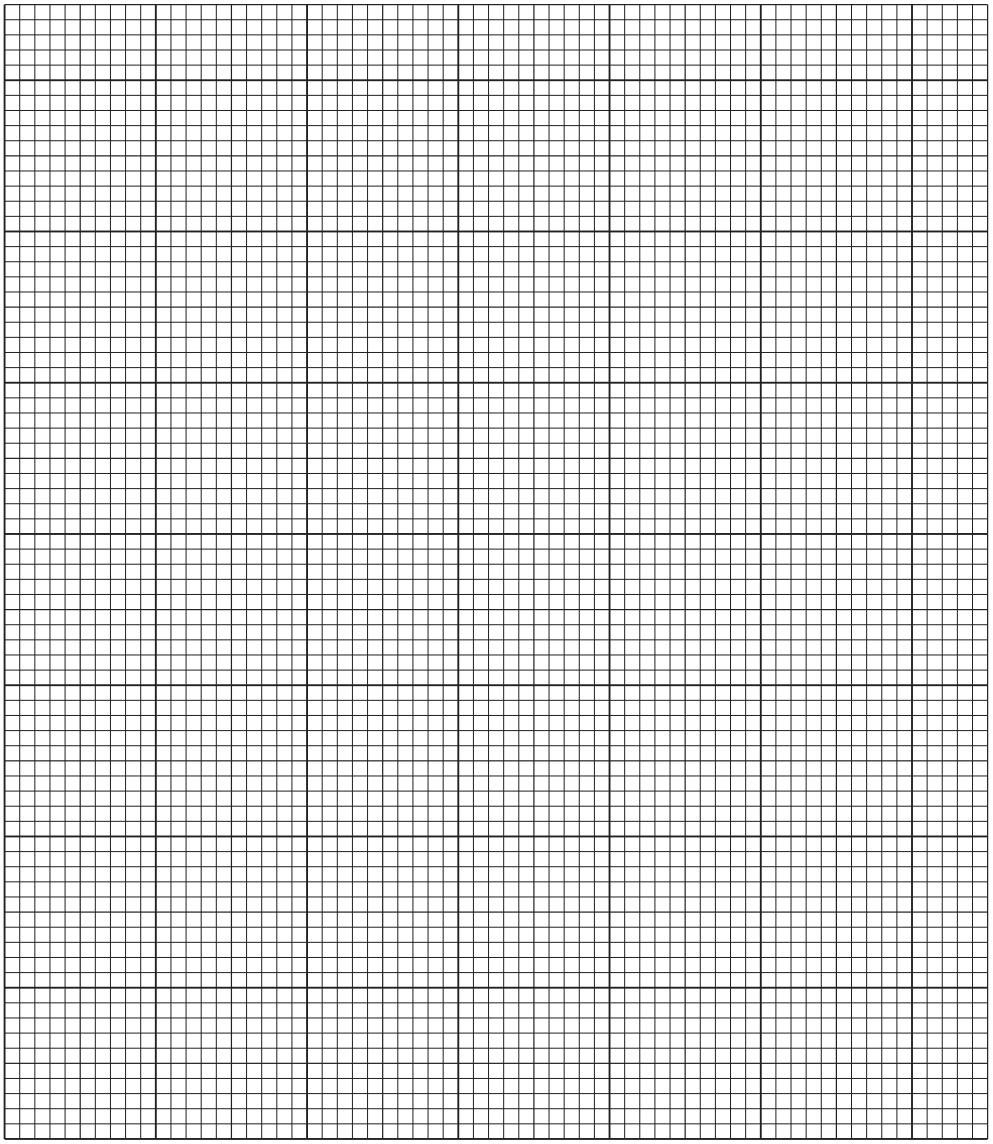
The student's results are shown in Table 2.1.

Table 2.1

carbon dioxide concentration / mg per dm^3	number of bubbles produced in 5 minutes
2	4
4	14
6	20
8	25
10	35
12	35

© UCLES 2021

(i) Plot a line graph on the grid of the data in Table 2.1.



[4]

(ii) Describe the trend shown on your graph in **2(b)(i)**.

.....

.....

..... [1]

(iii) The rate of photosynthesis can be given as the number of bubbles produced in one minute.

Use the information in Table 2.1 to calculate the rate of photosynthesis at a carbon dioxide concentration of 4 mg per dm^3.

Give your answer to **one** significant figure.

Space for working.

..... bubbles per minute
[2]

(iv) Identify the variable that the student changed in this investigation (the independent variable).

..... [1]

(c) Counting bubbles is not an accurate method for measuring the volume of gas produced by a plant during photosynthesis.

Plan an investigation to determine the effect of light intensity on the rate of photosynthesis. Your plan should include a more accurate method of measuring the volume of gas produced during the reaction.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 21]

© UCLES 2021

BLANK PAGE

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

© UCLES 2021